

TREATMENT PLANT OPERATOR

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in Gallatin, Tenn.**

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Dave Allen  
Power plant supervisor  
Oakland, Calif.

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top performer: **BIOSOLIDS**

Wastewater operator Bobby Tucker measures a clarifier sludge blanket at the Gallatin Wastewater Treatment Facility. (Photography by Rachel Paul)

# *Savings* in the Mix

THE GALLATIN TREATMENT PLANT TURNS TO LIME STABILIZATION TO CUT BIOSOLIDS COSTS SIGNIFICANTLY AND DELIVER A BENEFICIAL PRODUCT TO LOCAL FARMERS

By Ted J. Rulseh





**THE GALLATIN (TENN.) WASTEWATER TREATMENT** Facility used to pay farmers 2.5 cents per gallon — up to \$25,000 per month — to land-apply liquid Class B biosolids. Today, the plant produces a lime-stabilized Class A biosolids product that farmers can take away at no charge — and in the future may purchase by the ton.

It's all the result of a major upgrade that doubled the plant's design capacity to 12 mgd and added a lime stabilization building. Although the biosolids facility went online only last February, the product is already gaining favor with farmers and with local residents who use it on their gardens and lawns.

"Because we're just getting started, right now about 75 percent of our biosolids is going to landfill," says Brandon Traugher, chief wastewater plant operator. "We're just waiting for farmers to say, 'Hey, why go 40 or 50 miles down the road to buy lime to raise my soil pH when I can go to the treatment plant and get a product that does the same thing — and has nutrient value, too?'"

"The mayor [Jo Ann Graves] has said we're going to give it away for the first year just to see what the demand will be. If the farmers really want it once they start using it, then we may be able to generate a little

revenue. If we can charge, say, \$10 per ton, then we can almost recover the cost for the lime kiln dust we have to buy."

#### **BUILT FOR THE FUTURE**

Gallatin, county seat of Sumner County, is home to about 30,000. The flow to the treatment plant is about 90 percent residential. Inflow and infiltration cause flow spikes in the winter months; the city is investing about \$1 million a year in I&I control.

The original plant was built in 1970 and received a major upgrade in 1983. The new facility was built on the same site. "We were right at the old plant's capacity," says Traugher. "It was rated at 5.5 mgd, and our average flows were right around 5.5 to 6 mgd. We had to build for growth in the city."

The old plant had square-tank aeration basins with surface aerators. The new one, online since January 2011, has an oxidation ditch (Westl-ech) with anoxic and aerated zones. "We're on a big enough receiving stream [the Cumberland River] so that we don't have an ammonia limit yet, but the state and EPA require us to monitor for it on a quarterly basis. So, anticipating that we'll probably have an ammonia limit in the future, we decided to put a system in place to allow for ammonia removal."





## profile Gallatin (Tenn.) Wastewater Treatment Facility

POPULATION SERVED:	30,000
PLANT FLOWS:	12 mgd design, 6 mgd average
PLANT PROCESS:	Activated sludge/oxidation ditch
BIOSOLIDS PROCESS:	Aerobic digestion, centrifuge dewatering
BIOSOLIDS USE:	Lime stabilization (landfill as a backup)
BIOSOLIDS VOLUME:	770 dry tons per year
WEBSITE:	<a href="http://www.gallatinpublicutilities.com">www.gallatinpublicutilities.com</a>
GPS COORDINATES:	Latitude: 36°20'05.45" N; Longitude: 86°27'49.54" W

The Gallatin team includes, from left, chief wastewater plant operator Brandon Traughber, wastewater attendants Leslie Gammons and Terry Fultz, wastewater operator I Wayne Thompson, and wastewater operator II Bobby Tucker. Not shown: wastewater assistant Kevin Byrd and wastewater operator II Gary Henson.

Waste activated sludge goes straight to the Number 4 digester, aerated continuously during a five-day detention time. It then gravity feeds into the Number 5 digester for daily aeration (about 12 hours), followed by settling and decanting.

Thickened material (1.5 to 1.75 percent solids) is then pumped to the Number 6 digester, which essentially serves as a holding tank. Digested solids first pass through an inline Muffin Monster grinder (JWC Environmental) and then to a polymer injection system (Fluid Dynamics). The material is then fed to one of three centrifuges (Andritz Separation), each with 220 gpm capacity, that dewater it to 23 to 24 percent solids.

The resulting cake can be emptied into trailers and sent to landfill or fed into the lime stabilization process, supplied by Alka-Tech.

### MAKING PRODUCT

"Material comes out of the centrifuge discharges into an auger that sends it over to the lime stabilization building," says Traughber. "It fills a hopper there, and once the hopper gets to a certain level, the system kicks into automatic. It augers biosolids out of the bin and sends it to a mixer that adds lime kiln dust.

"The mixing process is automated — we can adjust the mix by way of the SCADA system (M/R Systems). Currently, the auger pulls out about 600 pounds per minute, to which we add 200 pounds of lime kiln dust. We run the process about six to eight hours a day, generating about 30 tons of material."

The mixture is transferred to four bunkers inside a sheet metal building.

*(continued)*

"A load of centrifuged cake that goes to landfill costs us about \$900. If we take that same amount, add about \$400 of lime kiln dust and treat it down to Class A, we can save about \$500."

### BRANDON TRAUGHBER

Traughber's fully cross-trained operations team includes Bobby Tucker and Gary Henson, wastewater operator II; Wayne Thompson, wastewater operator I; Leslie Gammons, Matt Wilson and Terry Fultz, wastewater attendants; and Kevin Byrd, wastewater assistant.

### DIGESTERS IN SERIES

On the solids side, the Gallatin team made the move to Class A largely to get beyond the site monitoring requirements associated with Class B material. Some 85,000 gallons per day of activated sludge is wasted from the oxidation ditch at 0.5 to 0.75 percent solids.

The plant has six digesters with a combined 3-million-gallon capacity. Numbers 1, 2 and 3 are kept empty and held in reserve for emergencies.



Centrifuged biosolids cake mixes with lime, then travels up a conveyor belt that delivers it to the bunkers. The lime stabilization process is supplied by Alka-Tech.



### IMPURE IS BETTER

The Gallatin lime stabilization process uses lime kiln dust instead of quick lime, even though that product is slightly more expensive, at about \$57 per ton.

"The kiln dust is about 45 percent active lime," says Brandon Traughber, chief plant operator. "If you use straight lime, you have to use more of it. That's because the federal 503 regulations require you to bulk up the material to over 50 percent solids.

"If you use straight lime, you have to add a lot just to bulk it up. The kiln dust contains about 55 percent inactive ingredients that help bulk up the mixture, yet it still contains enough lime to sustain the exothermic reaction."

The Gallatin plant stores up to 300 tons of lime kiln dust on site in two silos about 52 feet tall and 12 feet in diameter.

"The mayor has said we're going to give it away for the first year just to see what the demand will be. If the farmers really want it once they start using it, then we may be able to generate a little revenue."

#### BRANDON TRAUGHBER

There it stands for 72 hours at a pH above 12 to comply with federal standards for Class A material. "We have to make sure the temperature stays above 52 degrees C (126 degrees F) for at least 12 hours," Traughber says.

"We have a temperature probe in each bunker. We put that probe into the pile, and with the SCADA computer we trend that temperature over a 72-hour period. I wanted those temperature probes so that if the state ever had any question about whether we sustained the necessary temperature, we'd be able to pull up the chart and say, 'OK, what date do you want?' " Proper pH is verified by laboratory testing.

#### QUALITY MATERIAL

Heat from the exothermic reaction with the lime drives off substantial

The Gallatin plant uses drum screens manufactured by Parkson Corp.



Wastewater operator Wayne Thompson checks samples for *E. coli* testing in the room that houses the plant's UV disinfection system (WEDECO – a xylem brand).

moisture, so that the final product contains about 65 percent solids and has the consistency of cornmeal or flour. A small Kubota tractor with a chain-and-flight conveyor is used to load customers' incoming trucks or trailers with material for transport.

It's easy to see why the Gallatin team prefers to maximize lime stabilization in the future. "A load of centrifuged cake that goes to landfill costs us about \$900," says Traughber. "If we take that same amount, add about \$400 of lime kiln dust and treat it down to Class A, we can save about \$500. If we run the process four days a week, we can save \$2,000. If we do that over the course of a year, we're saving some real money."

"We'd like to get to 100 percent lime-stabilized biosolids and do away with landfilling — it costs us more, and it doesn't benefit anybody. If we lime stabilize, we save money, and local farmers get the benefit."

And the benefits are substantial for the area's high-clay, low-alkalinity soils. "In this part of the country, everybody has to lime their fields," says Traughber. "They're having to pay \$10 to \$15 a ton for lime."

Customers now, besides homeowners taking small amounts, are mainly fescue farmers who can apply material between cuttings of hay. Farmers have taken as much as 40 to 45 tons at a time. The material contains on average about 1.0 percent nitrogen and 0.5 percent potassium.





Chief wastewater plant operator Brandon Traughber checks plant operations on the SCADA system from a central office.

#### GETTING THE WORD OUT

So far, Gallatin has relied mainly on word-of-mouth marketing, although Gallatin Utilities included a letter about the material in residents' water bills and information is available on the city website.

"We've also have talked with the county agriculture extension office, the local Natural Resources Conservation Service, and the University of Tennessee Extension office," says Traughber. The idea is that advisors in those offices will let farmers know about the products as an alternative to commercial lime.

"It just takes time," he says. "At the time we started making the product, a lot of farmers had just finished liming their fields before they started their spring crops. We just barely missed that window."

"Give us a year to get the word out. I'm hoping that by this time next year, once farmers start talking among themselves, we'll see plenty of demand. A lot of farmers are saying that in fall when the crops come off, that's when they're going to start using it." **tpo**

"It just takes time. At the time we started making the product, a lot of farmers had just finished liming their fields before they started their spring crops. We just barely missed that window."

**BRANDON TRAUGHBER**

#### more info:

**Andritz Separation, Inc.**  
800/433-5161  
[www.andritz.com](http://www.andritz.com)

**Alka-Tech**  
800/247-2464  
[www.alka-tech.com](http://www.alka-tech.com)

**Fluid Dynamics Inc.**  
888/363-7886  
[www.dynablend.com](http://www.dynablend.com)

**JWC Environmental**  
800/331-2277  
[www.jwce.com](http://www.jwce.com)

**KROHNE, Inc.**  
800/356-9464  
[www.us.krohne.com](http://www.us.krohne.com)

**M/R Systems, Inc.**  
678/325-2800  
[www.mrsystems.com](http://www.mrsystems.com)

**Parkson Corporation**  
888/727-5766  
[www.parkson.com](http://www.parkson.com)

**Pulsar Process Measurement Inc.**  
850/279-4882  
[www.pulsar-pm.com](http://www.pulsar-pm.com)

**WEDECO – a xylem brand**  
704/409-9700  
[www.xylem-inc.com](http://www.xylem-inc.com)

**WesTech Engineering, Inc.**  
801/265-1000  
[www.westech-inc.com](http://www.westech-inc.com)

#### UPGRADE INNOVATION

The upgrade to the Gallatin Wastewater Treatment Facility had benefits beyond the new oxidation ditch secondary treatment system and the Class A biosolids process. It includes innovations that improve effluent quality, enhance staff efficiency, and conserve potable water. "We have four new secondary clarifiers, but we still keep the original clarifiers to use for tertiary clarification," says Brandon Traughber, chief plant operator. "It wasn't very expensive to rehab them. The effluent from the new secondary clarifiers actually feeds the old clarifiers. That way, if anything else can settle out, we get that opportunity."

"The old plant used chlorine disinfection, and we switched over to UV [WEDECO – a xylem brand]," he says. "We have four UV banks and run at about 25 percent of capacity. We rehabbed the old chlorine contact chamber and built a building on top of that for the UV system and our internal plant water system." That system provides 250,000 to 300,000 gpd of final effluent for purposes such

as equipment washdown and office landscape irrigation.

"We add liquid bleach to the plant water to provide a little chlorine residual for personal protection," says Traughber. "When we first switched over from the old plant to the new, the man from the utility who reads our meter thought it was broken. They called me from the office and said, 'What's wrong with your water meter? You only used 300 gallons last month.' Our annual budget for water used to be \$60,000 per year. This year it was \$2,000."

A SCADA system (M/R Systems) was another major improvement. The plant is now fully automated. Magmeters (KROHNE) and ultrasonic sensors (Pulsar Process Measurement) monitor water levels and flows throughout the process. Various labor-intensive processes have been automated. For example, operators no longer have to activate pumps manually to pump out the scum pits. A sensor now monitors the level and turns the pumps on and off as needed.